

Appl. No. 10/813,250
Reply to Office Action of 12/22/2006

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REMARKS/ARGUMENTS

Applicants respectfully request reconsideration and allowance of the subject application. In the Office Action mailed December 22, 2006 all the claims in the application were rejected for obviousness. Applicants have discovered a defect in the rejection of the claims and have re-presented all of the claims that were canceled in the last submitted Amendment and Request for Reconsideration (Amendment). Accordingly, claims 1 and 2, 9 and 10, 12-22 and 25 and 26, canceled in the last Amendment, are re-presented as new claims 28 and 29, 30 and 31, 32-42 and 43 and 44, respectively. Applicants apologize for the peculiarity of this amendment, but will explain its basis hereafter.

Claims 3-8, 11, 23, 24 and 27 stand rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0009404 (the "Tsybulevskiy publication") in view of US 6,482,316 (the "Bal patent"). This same rejection was applied against the independent claims 1 and 12 in the prior Office Action which are now re-presented as claims 28 and 32. The new rejection applies additional references in an attempt to add up to all of the limitations in independent claim 27, but Applicants will first address the core combination of the Tsybulevskiy publication and the Bal patent which underlies all of the rejections.

The Tsybulevskiy publication discloses contacting a hydrocarbon stream containing sulfur compounds with a synthetic zeolite adsorbent-catalyst heavily loaded with transition metals to produce a hydrocarbon stream having a reduced concentration of sulfur compounds. As stated in the Office Action, the Tsybulevskiy publication does not disclose that the adsorbent is contacted with a desorbent to produce a desorbent containing sulfur compounds and an adsorbent having a reduced content of sulfur compounds, does not disclose that the adsorbent with a reduced content of sulfur compounds is contacted with a hydrocarbon stream containing sulfur compounds, does not disclose fractionating the desorbent containing sulfur compounds to obtain a desorbent with reduced sulfur and does not disclose use of a split-shell fractionation column. Office Action at page 3. However, the Office Action contends the Bal patent discloses desorbing sulfur compounds from an adsorbent and treating the desorbent to remove sulfur from the desorbent.

Applicants respectfully submit that there is no motivation to combine the teachings of the Tsybulevskiy publication and the Bal patent. The Tsybulevskiy publication teaches

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an adsorbent-catalyst thermal regeneration step of contacting the adsorbent-catalyst with a flowing gas at an elevated temperature of 180° to 300°C. On the other hand, the Bal patent teaches use of a liquid desorbent to remove adsorbed sulfur compounds from the adsorbent. "Desorbent" typically denotes a liquid to those of ordinary skill in the art of chemical engineering. Moreover, the Bal patent discloses that "the desorbents will boil in the range of the hydrocarbon stream being desulfurized," col. 2, lines 53-54, typifies organic solvents as suitable desorbents, col. 3, lines 46-47 and refers to liquid space velocities when describing the conditions under which the desorbent can be hydrotreated to remove the sulfur compounds, col. 3, line 67 to col. 4, line 1. Additionally, the Bal patent discloses that additional steps must be performed to separate the sulfur compounds from the desorbent including reactive processes such as hydrotreating and fractionation. Col. 3, lines 26-45. The Tsybulevskiy publication discloses no need to have to resort to reactive or distillative processes to remove sulfur compounds from the flowing gas stream used for thermal regeneration of the adsorbent-catalyst. Moreover, there is no teaching that a liquid desorbent would be adequate to remove sulfur compounds, let alone sulfur-oxidated compounds, from the synthetic zeolite heavily laden with transition metals utilized in the Tsybulevskiy publication. Lastly, all of the claims in the subject application recite a step of fractionating the desorbent containing sulfur-oxidated compounds which would be unnecessary with the process and adsorbent-catalyst of the Tsybulevskiy publication. Applicants respectfully submit that one of ordinary skill in the art would not be motivated to modify the simple thermal regeneration process of the Tsybulevskiy publication without need of fractionation or reaction to include the use of a liquid desorbent of unknown effectiveness in desorbing sulfur compounds from the adsorbent-catalyst of the Tsybulevskiy publication and which must include the concomitant fractionation or reaction to purify the desorbent for reuse.

Moreover, claims 27 and 32 recite purging steps which are not disclosed in either of the Tsybulevskiy or Bal references. Neither of these references discloses the presence of interstitial hydrocarbons on the adsorbent that would predicate the need for a process revision to incorporate a purge step. The purging disclosed in US 4,354,929 (the "Wessels patent") is to remove non-internally sorbed molecules and residual feed vapor remaining in non-selective areas remaining in the bed after adsorption. Col. 4, lines 48-54. Without the Tsybulevskiy or Bal references stating a presence of non-internally sorbed molecules or

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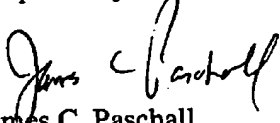
residual feed after adsorption, one of ordinary skill in the art would not consult with the Wessels patent.

Claim 27 further recites use of a split-shell fractionation zone. The Office Action proposes that US 6,395,950 B1 (the "Rice patent") teaches use of a divided wall column to assist in the separation of three streams 28, 30 and 32. However, none of the Tsybulevskiy, Bal or Wessels references discusses the need for a fractionation into three streams. Applicants respectfully submit that one of ordinary skill in the art would not be motivated to use a divided wall column of the Rice patent in the processes of the Tsybulevskiy, Bal or Wessels references.

Applicants respectfully submit that lacking motivations to combine, none of the independent claims 27, 28 and 32 is obvious over the cited references. For at least the same reasons, claims 3-8, 11, 29-31 and 23, 24, 32-44 depending from claims 28 and 32, respectively, are also not obvious.

For the foregoing reasons, Applicants respectfully request reconsideration and allowance. Applicants apologize for the repositioning taken in this prosecution. Should the Examiner wish to discuss this matter, he is invited to contact the undersigned.

Respectfully submitted,


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JCP/gm